

## CLAIMS

What is claimed is:

- 5           1. A high power surface mountable light emitting device comprising:
- a light emitting semiconductor chip;
- a thermally and electrically conductive lead frame connected to said chip and exposed over a substantial
- 10   portion of the underside of the device;
- a lead wire from said chip to a contact exposed at least partially on a side of said device; and
- a lens over said chip wherein the lens comprises:
- a lower transfer section; and
- 15           an upper ejector section situated upon the lower transfer section, said lower transfer section operable for placement upon the light emitting semiconductor chip and operable to transfer the radiant emission to said upper ejector section, said upper ejector section shaped such that
- 20   the emission is redistributed externally into a substantial solid angle.
2. The device of Claim 1 wherein the lower transfer section is a solid of revolution having a profile
- 25   in the shape of an ellipse with a long axis parallel to an axis of revolution of the solid and displaced laterally therefrom so as to place the focus of said elliptical profile on the opposite side of said axis.
3. The device of Claim 2 wherein the upper
- 30   ejector section is a cylinder of the same diameter as a top diameter of the transfer section, said cylinder having a conical depression on its top surface.

4. The device of Claim 2 wherein said lateral displacement substantially equals the radius of said ellipsoid at its focus.

5 5. The device of Claim 1 wherein said upper ejector section is a conicoid.

6. The device of Claim 1 wherein said upper ejector section is a everted sphere.

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7. The device of Claim 1 wherein said upper ejector section is an indented section of a sphere.

8. The device of Claim 4 wherein said upper ejector section is a cylinder.

9. The device of Claim 1 wherein the upper ejector section has a diffusive surface.

20 10. The device of claim 1 wherein the lens has a surface with graded sub-wavelength roughness for reflective scattering of said emitted light out of said device.

11. The device of Claim 1 wherein the lens is made of transparent material for distributing the radiant emission of a light emitter, comprising an expander section for receiving said radiant emission and narrowing its angular range to that of light guiding via total internal reflection, and a cylindrical ejector section for receiving said angularly narrowed radiation and ejecting it by means of graded sub-wavelength roughness on its surface.

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12. The device of Claim 1 wherein said lens comprises substantially encasement of an upper side of said

chip in a transparent compound.

13. The device of Claim 12 wherein said transparent compound forms both a lens and a portion of the  
5 body about the lead frame.

14. The device of Claim 13 wherein said transparent compound is keyed into the metallic lead frame and said contact to reduce separation.  
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15. The device of Claim 1 wherein said device includes a reflector cup about said chip to reflect light from the sides of the chip generally into a direction extending from the upper surface of said chip.  
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16. The device of Claim 15 wherein said reflector cup is metallic.

17. The device of Claim 15 wherein said reflector cup comprises a core material with a highly reflective metallic coating.  
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18. The device of Claim 17 wherein said reflective coating comprises chromium or silver plating.  
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19. The device of Claim 18 wherein said lead frame comprises a substantially copper core with at least one other metal plating on an underside thereof.

20. The device of Claim 19 wherein said metal plating on said underside of said lead frame comprises a plating of solder or palladium.  
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21. The device of Claim 15 wherein said

transparent compound comprises an epoxy resin.

22. The device of Claim 1 wherein said lead wire to said contact is a gold wire.

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